



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,453	11/26/2003	Satoshi Sasaki	117888	8104
25944	7590	11/15/2005	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			SEMENENKO, YURIY	
			ART UNIT	PAPER NUMBER
			2841	

DATE MAILED: 11/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/721,453

Applicant(s)

SASAKI ET AL.

Examiner

Yuriy Semenenko

Art Unit

2841

MW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 4/26/05page1.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Objections*

1. Claims 2-12 are objected to because of the following informalities:  
Claims 2-12, "An electronic component" should be changed to – the electronic component —for proper antecedence basis.  
Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

- 2.1. Claims 1-2, 7 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Sen et al. (Patent #5414222 hereinafter "Sen").

2.1.1. Regarding claim 1: Sen discloses in Fig. 1 an electronic component comprising: a substrate 20, Fig.2 having a through hole 24 formed in a thickness direction thereof; and a conductor 21, disposed in the through hole, for electrically connecting one side of the substrate to the other side thereof; wherein the through hole has a major axis diameter and a minor axis diameter on at least one of one side and the other side of the substrate, Fig. 2 and 3B.

Art Unit: 2841

2.1.2. Regarding claim 2: Sen discloses the electronic component according to claim 1, wherein the through hole has a form satisfying

$$1 < (D3/D4) \leq 5$$

where D3 is the major axis diameter on the one side, and D4 is the minor axis diameter on the one side, ( Fig. 3B (we suppose to that drawing made in scale).

2.1.3. Regarding claim 7: Sen discloses the electronic component according to claim 1, further comprising a plurality of conductive films 21 and 31, Fig 2 and Fig. 1 arranged with a gap therebetween extending in the thickness direction of the substrate; and wherein the conductor 24, Fig. 2 electrically connects the conductive films to each other (column 3, lines 12-15).

2.1.4. Regarding claim 9: Sen discloses the electronic component according to claim 7, wherein the through hole 24, Fig. 2 is formed so as to have a major axis direction extending along a longitudinal direction of the conductive films 21 and 31.

2.2. Claims 1 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Kobayashi Keiichi (Patent # JP-2000-286125 hereinafter "Kobayashi")

2.2.1. Regarding claim 1: Kobayashi discloses in Fig. 2 an electronic component comprising: a substrate having a through hole 40 formed in a thickness direction thereof; and a conductor 12, Fig.1, disposed in the through hole, for electrically connecting one side of the substrate to the other side thereof; wherein the through hole 30 has a major axis diameter and a minor axis diameter on at least one of one side and the other side of the substrate.

2.2.2. Regarding claim 7: Kobayashi discloses in Fig. 2 the electronic component comprising according to claim 1, further comprising a plurality of conductive films 30 arranged with a gap 20 therebetween extending in the thickness direction of the substrate; and wherein the conductor electrically connects the conductive films to each other.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3.1. Claims 3, 8 are rejected under 35 U.S.C. 103(a) as being obvious over Sen in view of Hanson (Patent # 5841075 hereinafter "Hanson").

3.1.1. Regarding claim 3: Sen discloses in Fig. 1 a, the electronic component having all of the claimed features as discussed above with respect claim 1,

except, Sen doesn't explicitly teach the through hole has a form satisfying

$$0.4 \leq (D5/D4) \leq 0.94$$

where D4 is the minor axis diameter on the one side, and D5 is the minor axis diameter on the other side.

Hanson discloses the through hole has a form satisfying

$$0.4 \leq (D5/D4) \leq 0.94$$

Art Unit: 2841

where D4 is the minor axis diameter on the one side, and D5 is the minor axis diameter on the other side (column 22, lines 1-18). Therefore, at time the invention was made, it was well know to use the through hole has a form satisfying

$$0.4 \leq (D5/D4) \leq 0.94$$

where D4 is the minor axis diameter on the one side, and D5 is the minor axis diameter on the other side .

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention that the through hole has a form satisfying

$$0.4 \leq (D5/D4) \leq 0.94$$

where D4 is the minor axis diameter on the one side, and D5 is the minor axis diameter on the other side.

Benefit of doing so is to easy make via by technology using laser's beam, as taught by Hanson.

3.1.2. Regarding claim 8: Sen discloses in Fig. 1 a , the electronic component having all of the claimed features as discussed above with respect claim 7,

except, Sen doesn't explicitly teach the through hole has a length D0 of  $D0 \leq 500 \mu\text{m}$  in each conductive film as seen in a minor axis direction.

Hanson discloses the through hole has a length D0 of  $D0 \leq 500 \mu\text{m}$  in each conductive film as seen in a minor axis direction (column 9, lines 1-4). At time the invention was made, it was well know to use the through hole has a length D0 of  $D0 \leq 500 \mu\text{m}$  in each conductive film as seen in a minor axis direction.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention that the through hole has a length D0 of  $D0 \leq 500 \mu\text{m}$  in each conductive film as seen in a minor axis direction.

Benefit of doing so is to obtain greater wiring densities.

3.2. Claims 4-6 are rejected under 35U.S.C. 103(a) as being obvious over Sen in view of Higgins, III (Patent # 5117069 hereinafter "Higgins").

3.2.1. Regarding claim 4: Sen discloses the electronic component having all of the claimed features as discussed above with respect claim 1,

except, Sen doesn't explicitly teach the through hole comprises a plurality of holes arranged along the thickness direction of the substrate; and wherein the holes formed adjacent each other in the thickness direction of the substrate have respective center axes shifted from each other as seen in a predetermined direction orthogonal to the thickness direction of the substrate.

Higgins discloses in Fig. 2, the through hole, comprises a plurality of holes 42, 44, 46, 48 arranged along the thickness direction of the substrate; and wherein the holes formed adjacent each other in the thickness direction of the substrate have respective center axes shifted from each other as seen in a predetermined direction orthogonal to the thickness direction of the substrate. Therefore, at time the invention was made, it was well know to use the through hole comprises a plurality of holes arranged along the thickness direction of the substrate; and wherein the holes formed adjacent each other in the thickness direction of the substrate have respective center axes shifted from each other as seen in a predetermined direction orthogonal to the thickness direction of the substrate.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention that the through hole comprises a plurality of holes arranged along the thickness direction of the substrate; and wherein the holes formed adjacent each other in the thickness direction of the substrate have respective center axes shifted from each other as seen in a predetermined direction orthogonal to the thickness direction of the substrate.

Benefit of doing so is to provide higher density of the electrical circuits.

3.2.2. Regarding claim 5: Sen discloses the electronic component having all of the claimed features as discussed above with respect claim 4,

except, Sen doesn't explicitly teach the predetermined direction orthogonal to the thickness direction of the substrate is the minor axis direction of the through hole.

Higgins discloses in Fig. 2, the predetermined direction orthogonal to the thickness direction of the substrate is the minor axis direction of the through hole. [We can consider minor axis direction of the through hole as direction which lies on plane of Fig. 2 and orthogonal to the thickness direction of the substrate.] Therefore, at time the invention was made, it was well known the predetermined direction orthogonal to the thickness direction of the substrate is the minor axis direction of the through hole.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention that the predetermined direction orthogonal to the thickness direction of the substrate is the minor axis direction of the through hole.

Benefit of doing so is to provide higher density of the electrical circuits.

3.2.3. Regarding claim 6: Sen discloses the electronic component having all of the claimed features as discussed above with respect claim 1,

except, Sen doesn't explicitly teach the through hole comprises a plurality of holes arranged along the thickness direction of the substrate; and wherein the holes formed adjacent each other in the thickness direction of the substrate are kept from overlapping each other as seen in the thickness direction of the substrate.

Higgins discloses in Fig. 2, the through hole comprises a plurality of holes arranged along the thickness direction of the substrate; and wherein the holes formed adjacent each other in the thickness direction of the substrate are kept from overlapping each other as seen in the thickness direction of the substrate. Therefore, at time the invention was made, it was well known the through hole comprises a plurality of holes arranged along the thickness direction of the substrate; and wherein the holes formed adjacent each other in the thickness direction of the substrate are kept from overlapping each other as seen in the thickness direction of the substrate.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention that the through hole comprises a plurality of holes arranged along the thickness direction of the substrate; and wherein the holes



Art Unit: 2841

formed adjacent each other in the thickness direction of the substrate are kept from overlapping each other as seen in the thickness direction of the substrate.

Benefit of doing so is to easy make through-holes by laser technology.

3.3. Claims 10-12 are rejected under 35U.S.C. 103(a) as being obvious over Sen in view of Kobayashi Keiichi (Patent # JP-2000-286125 hereinafter "Kobayashi") and view of Kitahara (Patent #6273558 hereinafter "Kitahara")

3.3.1. Regarding claim 10: Sen discloses the electronic component having all of the claimed features as discussed above with respect claim 7,

except Sen does not explicitly teach the conductor includes a first conductor and a second conductor; wherein the first conductor electrically connects the first electrode film and the second terminal electrode film to each other; and wherein the second conductor electrically connects the second electrode film and the first terminal electrode film to each other.

Kitahara discloses in Fig. 2 the conductor includes a first conductor 20a and a second conductor 21a; the first conductor 21a electrically connects the first electrode film 22 and the second terminal electrode film to each other; and wherein the second conductor 20a electrically connects the second electrode film and the first terminal electrode film 23 to each other. Therefore, at time the invention was made, it was well know the conductor includes a first conductor and a second conductor; wherein the first conductor electrically connects the first electrode film and the second terminal electrode film to each other; and wherein the second conductor electrically connects the second electrode film and the first terminal electrode film to each other.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention the conductor includes a first conductor and a second conductor; wherein the first conductor electrically connects the first electrode film and the second terminal electrode film to each other; and wherein the second conductor electrically connects the second electrode film and the first terminal electrode film to each other to provide more possibility for routing of the electrical signals.

Sen fail also to explicitly teach the conductive film comprises a first electrode film, a first terminal electrode film, a second electrode film, and a second terminal electrode film; wherein the first electrode film and first terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a first insulating gap therebetween; wherein the second electrode film and second terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a second insulating gap therebetween; wherein the second electrode film opposes the first electrode film and first terminal electrode film by way of the substrate; wherein the second terminal electrode film opposes the first electrode film by way of the substrate.

Kobayashi discloses in Fig. 2, the conductive film comprises a first electrode film 20, a first terminal electrode film 30, a second electrode film 20, and a second terminal electrode film 30; wherein the first electrode film and first terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a first insulating gap therebetween; wherein the second electrode film and second terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a second insulating gap therebetween; wherein the second electrode film opposes the first electrode film and first terminal electrode film by way of the substrate; wherein the second terminal electrode film opposes the first electrode film by way of the substrate. Therefore, at time the invention was made, it was well know to use the conductive film comprises a first electrode film, a first terminal electrode film, a second electrode film, and a second terminal electrode film; wherein the first electrode film and first terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a first insulating gap therebetween; wherein the second electrode film and second terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a second insulating gap therebetween; wherein the second electrode film opposes the first electrode film and first terminal electrode film by way of the substrate; wherein the second terminal electrode film opposes the first electrode film by way of the substrate.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention that the conductive film comprises a first electrode film, a first terminal electrode film, a second electrode film, and a second

terminal electrode film; wherein the first electrode film and first terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a first insulating gap therebetween; wherein the second electrode film and second terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a second insulating gap therebetween; wherein the second electrode film opposes the first electrode film and first terminal electrode film by way of the substrate; wherein the second terminal electrode film opposes the first electrode film by way of the substrate.

Benefit of doing so is to provide possibility of moving of the film layer.

3.3.2. Regarding claim 10: Kobayashi discloses in Fig. 2 the electronic component having all of the claimed features as discussed above with respect claim 7, wherein the conductive film comprises a first electrode film 20, a first terminal electrode film 30, a second electrode film 20, and a second terminal electrode film 30; wherein the first electrode film and first terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a first insulating gap therebetween; wherein the second electrode film and second terminal electrode film are disposed at the same position as seen in the thickness direction of the substrate with a second insulating gap therebetween; wherein the second electrode film opposes the first electrode film and first terminal electrode film by way of the substrate; wherein the second terminal electrode film opposes the first electrode film by way of the substrate,

except Kobayashi does not explicitly teach the conductor includes a first conductor and a second conductor; wherein the first conductor electrically connects the first electrode film and the second terminal electrode film to each other; and wherein the second conductor electrically connects the second electrode film and the first terminal electrode film to each other.

Kitahara discloses in Fig. 2 the conductor includes a first conductor 20a and a second conductor 21a; the first conductor 21a electrically connects the first electrode film 22 and the second terminal electrode film to each other; and wherein the second conductor 20a electrically connects the second electrode film and the first terminal electrode film 23 to each other. Therefore, at time the invention was made, it was well know the conductor includes a first conductor and a second conductor; wherein the first conductor electrically connects the

first electrode film and the second terminal electrode film to each other; and wherein the second conductor electrically connects the second electrode film and the first terminal electrode film to each other.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Kobayashi to include in his invention the conductor includes a first conductor and a second conductor; wherein the first conductor electrically connects the first electrode film and the second terminal electrode film to each other; and wherein the second conductor electrically connects the second electrode film and the first terminal electrode film to each other to provide more possibility for routing of the electrical signals.

Benefit of doing so is to provide possibility of another electrical circuitry.

3.3.3. Regarding claim 11: Sen discloses the electronic component having all of the claimed features as discussed above with respect claim 10,

except Sen does not explicitly teach a group of the first electrode film and first terminal electrode film and a group of the second electrode film and second terminal electrode film are alternately disposed within the substrate with a gap in the thickness direction of the substrate.

Kobayashi discloses in Fig. 2, a group of the first electrode film and first terminal electrode film and a group of the second electrode film and second terminal electrode film are alternately disposed within the substrate with a gap in the thickness direction of the substrate. Therefore, at time the invention was made, it was well know a group of the first electrode film and first terminal electrode film and a group of the second electrode film and second terminal electrode film are alternately disposed within the substrate with a gap in the thickness direction of the substrate.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention a group of the first electrode film and first terminal electrode film and a group of the second electrode film and second terminal electrode film are alternately disposed within the substrate with a gap in the thickness direction of the substrate.

3.3.4. Regarding claim 12: Sen discloses the electronic component having all of the claimed features as discussed above with respect claim 1,

except Sen does not explicitly teach the substrate comprises a piezoelectric material and functions as an actuator.

Kitahara discloses in Fig. 2 the substrate comprises a piezoelectric material 19 and functions as an actuator (column 3, lines 22-25). Therefore, at time the invention was made, it was well known the substrate comprises a piezoelectric material and functions as an actuator.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Sen to include in his invention the substrate comprises a piezoelectric material and functions as an actuator.

Benefit of doing so is to provide piezoelectric vibrator unit.

#### ***Relevant Art***

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


4.1. Joy (Patent # 6395995 hereinafter "Joy"). Joy teaches the electrical contacts of an integrated circuit package are coupled to printed circuit board bonding pads that include vias having via channels. In one embodiment, a method for of any shape, including a circle, ellipse, polygon, or a free-form shape. Solder paste is screened through the mask onto the printed circuit board pads but not the via channels.

5.1. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yuriy Semenenko whose telephone number is (571) 272-6106. The examiner can normally be reached on 8:30am - 5:00pm.

5.2. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571)- 272-1957. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

5.3. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

YS



KAMAND CUNEO  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800